LEARNING TO LIVE WITH AND LOVE THE NEW TECHNOLOGY

Here is an update on some of the more important electronic tools available to designers working with moving images on film and videotape.

Above: Scanimate, a computer-generated animation system. Dolphin Productions/Computer Image Corp. Below: Caesar, a second-generation animation system capable of highly sophisticated (but as yet mostly experimental) techniques. Computer Image Corp.

The best general statement that can be made about the new electronic technology in graphic design is that most creative people are either frightened or intimidated by it, or couldn't care less. The reason for these reactions is that creative people get their kicks from the *feel* of creation—the act of manipulating materials on a one-to-one basis (i.e., chalk and paints on a blank piece of paper or canvas, a blowtorch on metal, a chisel on stone, people and settings on a stage or set, etc.). But with electronic design, the "feel" of creation assumes very different proportions. Often, in the minds of designers, it becomes lost entirely.

Anyone who has ever flown a plane or glider and experienced the response of handling the plane's controls knows that unmistakable feeling of satisfaction. The plane becomes an extension of yourself. In the same way, electronic technology can only "work" when the artist feels that the equipment is an extension of himself. If this does not happen, there is no excitement—only frustration and alienation. The equipment becomes a fad in the hands of hacks. Serious creative work is not given the opportunity to develop.

It is for this reason that I emphasize in this article interest in the *product* of technology and not the technology itself. Equipment is a means to an end. Many lose sight of that fact.

In setting up criteria for evaluating technologies, one must make the distinction between materials and technique. Some new technological advances make it possible to utilize new materials. The comparatively recent development of acrylic paints and plastics, for instance, provides the means to create new images, new shapes and forms for new dimensions of expression. Other technologies permit manipulation of existing materials differently. For example, black-and-white film with the addition of color results in a new and dramatic aspect of a familiar creative medium. Still other developments allow designers to continue to do what they have always been doing—only more quickly, cheaply, or with greater flexibility. The Magic Marker for quick sketches and storyboards is a good example.

This article will review some of the newer technologies that are being developed or are now available for utilization by graphically-oriented people working with moving images on film and videotape. Each system will be described and evaluated in the light of the above-mentioned criteria. Above all, the "one-to-one" relationship will be emphasized—the creative involvement which will enable designers actually to *enjoy* these new devices.

By no means will this be a complete listing, since the field is constantly expanding. While some equipment and compa-

By Sheldon Satin

nies will be mentioned by name, it is important to realize that companies often are engaged in developing the same capabilities. What is listed, therefore, is an arbitrary selection of what this author feels are the most important developments and companies in the field.

Computer-Controlled Animation

Hard-edge art and its film counterpart, animated drawings, have long appealed to the graphic artist for many types of communications. Part of the reason for this appeal is that all of the elements in the frame can be controlled. Perhaps it is also because this form lends itself to abstraction and, therefore, strong words or ideas can be delivered to the viewer with minimum loss of impact. Much animation in TV commercials is used just to avoid paying costly residuals to "on-camera" performers.

Through the years, even animation has risen in cost to the point where many creative people have been forced to simplify animated pictures or resort to other means of delivering commercial messages, information, instruction or entertainment. It takes 1440 frames (or still pictures) to make one minute of animation on film. All sorts of methods have been tried to reduce the costs involved in drawing the countless cels and cut down on the time and labor used up positioning and exposing every one of the 1440 frames accurately.

Several time- and money-saving technological developments are worth mentioning here. The first is computer-controlled animation—best exemplified by the Cinetron equipment now installed at Optical House in New York City.

Computer-controlled animation is a means of automating the animation stand and camera so that all the moves can be accomplished quickly and accurately. The moves are recorded on punched tape so they can be rerun any time in the future. The equipment consists of a teletype keyboard connected to a small computer which, in turn, is connected to the animation stand control panel. Electric motors, instead of the traditional hand-operated handles, drive all of the moving elements of the animation stand and camera.

Verbal instructions are typed on the teletype which prints the instructions on paper to be read and checked for any errors. (Corrections or changes can be made easily.) A button is pressed and the computer does all the rest. It's really all very simple.

Applying our criteria, computer-controlled animation permits designers to *create* animation that can be produced more quickly, easily and, therefore, more inexpensively. It facilitates the use of more sophisticated moves and effects. It can accomplish incredibly slow zooms and crawls; it has a virtually

unlimited "fade scale" (scene-to-scene dissolves or scene-to-black and vice versa). It can also produce the "slit scan" effect first seen in Kubrick's *2001*, where titles and scenes move past both sides of the frame.

With computer-controlled animation, a sequence can be previewed by simply following the camera (which is converted to project a light) as it moves over the artwork or cels on the animation table. This ability to preview eliminates the time and money wasted waiting for a test on film to be shot and developed. This feature also allows designers and animators a great deal of latitude in creating difficult moves without running into prohibitive costs, and without risking the time for errors and miscalculations. While most people using this equipment will probably be animators, the art director also benefits, for it frees him to test and preview, to change and embellish more easily than before.

Another computer-controlled animation process has been developed by Jean De Joux and Optical Systems, Inc., Los Angeles. The De Joux system involves 1) a specially designed drawing table, 2) an editing and color table, 3) the De Joux optical console and multi-level projector, 4) an animation camera, and 5) a computer.

The animation table allows the animator to work in much the same manner as he has in the past, but with much greater ease, speed and continuity. The table incorporates two reels of matte-surfaced 70mm film mounted side by side, driven horizontally across the table by electronic mechanisms controlled by the animator. The animator draws part of the object on the first film aperture provided for that purpose. When finished, that image is projected on the ground glass under the second film aperture. This allows the animator complete control of his continuity as he advances the action with subsequent drawings on the film. The artist is able to change or modify his work immediately via an instantaneous playback system.

One of the great advantages of the De Joux process is that it is designed to reduce the number of actual drawings required to produce full animation without sacrificing any appreciable quality. The animator can actually duplicate in six to eight drawings the continuity of action which normally takes 24 drawings. This is accomplished with the optical console which produces dissolves that create the illusion of motion.

All of the equipment is linked together by a small computer. It is programmed from information contained on the animator's exposure sheet, much like the Cinetron system. Also, like Cinetron, there is a previewing capability which allows a change to be made, with the computer automatically making
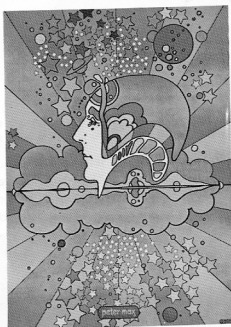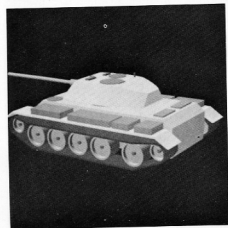
Left: Sequence shows computer-generated
"pictures" of tank produced by MAGI system.
Input is mathematical, not photographic.
Above: Poster art by Peter Max is given
movement on TV screen through Maxivision,
a joint venture of Max and Teletronics.
Right: Cels from Scanimate-produced titles
of "Great American Dream Machine," aired
by New York's public TV outlet, WNET.
Opposite page: CMX editing system; direct
editing is accomplished through memory
disc packs and light pen. CBS/Memorex.
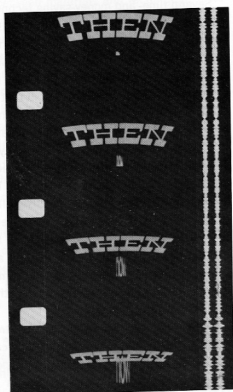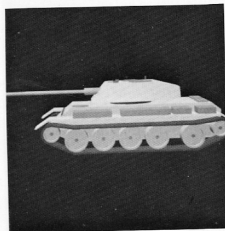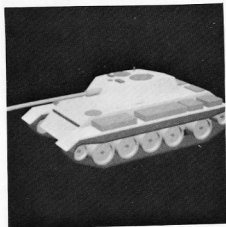
all the related changes. There is, in addition, a hard copy print-out. The final program is stored on magnetic tape for future access.

Animation and Videotape Processing

Several companies are involved in experimentation tests that substitute the videotape camera for the film camera. De Joux has been working with Vidtronics, Los Angeles, to convert animated artwork to a completed video master. This development will provide a valuable tool when it becomes available. It will provide the animator with instant replay. Electronic effects will simplify the matting process and allow a much greater manipulation of color than is now possible with traditional animation of film.

Computer-Generated Animation

One of the most interesting and important technical developments for the graphic designer could well be computer-generated animation and pictures. In some cases, these programs satisfy the cheaper, better and faster criteria. But, more important, the new technology provides a means of manipulating images in a new way and, in some cases, creating images that *never existed before.*

Computer Image Corporation (New York, Denver, Los Angeles) has two systems. The first is called "Scanimate." It is a hybrid computer system created with the graphic designer in mind. The Scanimate system emphasizes the use of print, logos, pictures, abstract forms and moving shapes. Scanimate cannot do character animation (Snow White, Bambi, etc.) but can produce simple line animation.

This is how it works: Black-and-white artwork is prepared on transparent sheets and placed on a flat surface in front of a TV camera which transmits the image to a cathode ray display tube (CRT). Several pieces of artwork can be combined on the CRT. Electronic controls are manipulated to produce an infinite variety of motion and effects like exploding, zooming, plasticizing, growing, shrinking, revolving, twisting, squeezing, undulating, etc. Although there are several dials, the system is not difficult to operate; you can work the dials yourself to get the "feel" of the special effects.

Every effect is in real-time (occurring in a natural time span) and can be rehearsed until you are satisfied. A separate monitor permits you to see the scene as it will look when completed in color. Once rehearsals have been completed and you are satisfied with the results, a film or videotape camera records the scene from the CRT.

When a film camera is used to record the scene on the CRT, black-and-white film is employed. Later, at the optical house, multiple passes are made on an optical bench to produce the color effects desired. When a videotape camera is used, a special color encoder converts the signals which are, in turn, transferred to a videotape recorder located in another room. The ability to work in black-and-white permits the designer to deliberately and accurately paint each gray level any color and any hue without regard for the colors of any other gray level. It is important to note here that the system not only permits artwork to be used for foreground and background, but also

allows live or prerecorded material on videotape to be used.

"Caesar" is the name given to the second computer system which is capable of generating much more sophisticated animation in real-time. In preparing character animation, segments can then be combined by the programmer. As with Scanimate, the movement of the animated character can be rehearsed and altered until it is ready for recording. Caesar is operational now in Denver, but is not available for general use at this time.

Computer-Generated Motion Pictures

In all of the systems discussed up to now, the input of an actual picture or drawing was necessary to produce the finished product. In one of the most remarkable developments to utilize advanced computer programs, still *and* motion pictures are created showing objects which have dimension, cast shadows, are in full color, and can be moved in any direction. Furthermore, the movement of the animated character can be programmed with a description of the object or from a storyboard. *There is no photographic input.* While there are many applications for this technology, MAGI (Mathematical Applications Group, Inc., White Plains, N.Y.) is the one company that is actively working with graphic artists in order to utilize its programming capabilities in the commercial and industrial field.

The MAGI system describes, in mathematical terms, an object's shape and color, its movement, a light source and a camera point of view. Once these basic components have been defined and recorded on computer tape, sophisticated computer programs are used to simulate the path of light rays as they emerge from the light source and are reflected from the surface of the object. The resulting data are displayed on a CRT and photographed by standard camera equipment.

The MAGI system creates moving images both faster and more economically than conventional picture-making technologies. But it is not to be used merely to replace existing animated or live-action techniques; it actually provides a new
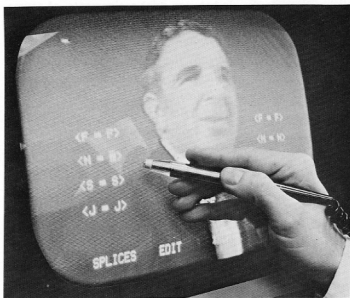
seven to ten seconds. The proof is still slightly tacky when it comes off the proof press, but it will be completely dry within a few minutes (versus six to seven hours under present conditions).

The advantages of heat-set proofing seem obvious. The inks are similar to the solvent-type inks used on production presses. They have a higher gloss than oil-base proofing inks, and they do not spread during the drying process, resulting in a dot which is crisper at the edges and gives a more detailed image.

Flaws, like moire patterns, which are frequently obscured on proofs pulled with oil-base inks, show up readily with heat-set inks.

The finisher can determine immediately what corrections are required on the plates. For the engraving plant personnel as well as for the client, heat-set proofing eliminates a wet proof. Heat-set proofs approximate the final production run much more closely, which should also reduce make-ready and ink adjustment time at the publication

printing plant.

At the moment, minor difficulties of this system involve applying precisely the correct amount of heat and formulating inks which will eliminate all of the trapping problems encountered during the early experiments—inks which will "stay open" on the proof press rollers for a reasonable length of time, not just for an hour or two.

The graphic arts industry is well on its way toward a solution of these present disadvantages of heat-set proofing. Once letterpress magazines begin to accept heat-set proofs on a widespread basis, they may well become a new standard in the engraving field.

(Klaus F. Schmidt is director of print production for Young & Rubicam.)

The New Technology
Continued from page 33

creative tool for the artist. For example, it will be possible to take a picture of a real person or scene, scan it with a camera attached to the computer, and combine these "digitized" pictures with computer-generated pictures. This capability opens up vast new areas for creative exploration.

Here's how you work with the MAGI system. You bring your layout or a storyboard (if it is a motion picture) to MAGI where each object's shape and color are translated to computer punch cards. (The artwork and storyboard are *not* photographed.) Directors' instructions (movement, camera position, light source, etc.) are also put on computer cards. These cards are then put through a computer which produces a magnetic computer tape. The MAGI computer plays the tape which generates the scene on a CRT monitor one frame at a time. From the CRT monitor corrections can be made on the punch cards. Once the final corrections have been made, a code typed on the teletype instructs the computer to display its pictures on a high resolution CRT which is being photographed by a still or motion picture camera. Even after the film is developed, opportunities exist to change or alter work.

With this new development in the relationship between the computer and the graphic arts, designers will be able to create three-dimensional objects that can be moved so that all sides of them can be seen—objects that have no reality beyond imagination and the computer's execution.

Electronically Manipulated Pictures on Videotape

There have been experiments conducted with various technologies to create a new electric palette for the artist. Maxivision, the joint venture between Peter Max and Teletronics International, New York, is the most provocative development to date. The easiest way to describe Maxivision is to say that it is Max's familiar posters brought to life in moving color. Max's graphics and other picture input are combined, colors bleed and run, halos of color leap across the screen. A multitude of special effects are utilized (slow, fast and stop motion; fragmentation and reassembly of scenes, etc.) with unusual results.

Here is a simple description of the way it works. Prepared graphics (Max's posters, etc.) are exposed to a videotape camera. The pictures, now on videotape, are then put through a special effects system (with a video disc attached that produces slow and stop motion effect). Max plays the effects system like an organ—mixing colors and changing their intensities, blowing up pictures, repositioning them (a frame at a time)—all the while working simultaneously with an eight-track stereo sound system. The picture and sound segments are then fed into a CMX editing system to produce the final master tape.

The significance of all of this is that Max is able to control all of this complex equipment to produce *precisely* the effects he has decided on—effects which are difficult or impossible to do on film.

CMX

CMX is a new editing technology that enables the creative person to relate directly to his material on a one-to-one basis. Creative people have always preferred film to videotape. During the editorial stage of post-production, film allows you to sit in a room with your editor and see and feel each frame as it moves back and forth on the moviola. Electronic editing, with its complicated and expensive equipment and its engineers, creates (despite efforts to the contrary) an aura of intimidation. Intimidation by dials, buttons and technically oriented people. CMX changes all that dramatically.

Now you and your editor can sit in a quiet room in front of two CRTs set into a simple console. The only instrument is a light pen. With this pen, you and your editor are again on a one-to-one relationship with each other and the material you work with. What's more, the CMX can be used to edit *both* film and videotape.

CMX, the product of a joint venture between CBS and Memorex, works like this: Film or videotape "takes" are fed into the CMX memory disc packs as

Print

"bits" of information. The original production footage is not touched during the editing session. The CMX has a command panel that lists all scenes and all editing instructions. These are superimposed over the right-hand CRT. When you have finished editing a scene, you transfer it to the left-hand CRT. This provides a means of maintaining continuity. The CMX remembers all of your commands. When you have finished editing the entire project, it can be replayed immediately and the results viewed—with desired changes made along the way.

Once you are completely satisfied, the CMX will produce a printed copy of all scenes used and the editing instructions. If the intent is to finish on film, this print-out is used by the layout man in an optical house. If you are finishing on videotape, a punched paper tape is also produced by the CMX which is used to program the videotape mastering equipment. The important thing to remember is that, regardless of the cost of this equipment and the complexity of its workings, the CMX is simplicity itself as far as editorial work is concerned.

Conclusion

What effect will all these technical developments have on creative work? How will it affect the designer's job?

Not a bit if he does not, or is not planning to, work in film or videotape. But if he is, these possibilities should be considered:

—Computer-generated animation will allow you to do the most complicated projects quickly and inexpensively.

—Computer-generated pictures will provide a whole new way to create images.

—Electronic manipulation with videotape will give you an expanded creative range in graphic design.

—Electronic editing equipment will allow you to work creatively, with vast flexibility—yet in a quiet, personal way.

All of this will enable you to work more productively. In the end, of course, it really isn't important how pencils or chalk or paints are made; it

is what you do with them that counts. The new electronic technologies are nothing more than your crayons of the future.

(Sheldon Satin is a principal in Throckmorton/Satin Associates, a New York consulting firm serving marketing and communications departments of major corporations and ad agencies. Previously, he was executive vice president/research and development for Electrographic Corporation where he was involved in developing new film and videotape capabilities for videocassette operations. Satin has been a member of the board of directors of the Film Producers Association, as well as a member of the Videotape Producers Association and the International Tape Association.)

Elinor Bunin
Continued from page 46

way to approach a musical score. "Actually, I find it somewhat easier to do a film to music from the start. There's something very helpful—especially if I'm doing animation—about having the musical beats to cut to, and a lot of animators prefer doing it that way. But I rather enjoy doing it differently for each job."

Doing things differently seems to be Elinor Bunin's main joy in her work, and, as she cautions her clients, whatever she does for them will look nothing like the reel that is her portfolio. "I feel that each job I do calls for another kind of solution," she says, "and if one of my jobs looks like another, I haven't really succeeded. I work to get the best possible effect for each assignment, and I don't apply any rules—except in the broadest sense. I decide what I want to do, then try to do it, rather than thinking in terms of what can or can't be done. You really have to think that way, or else you don't do really innovative things."

Despite the satisfaction she derives from her work, Elinor Bunin still has an unfulfilled dream of her own. "I'd love to do a full-length feature film," she says, "one that would be complete in itself and would be shown theatrically. But I'm always involved in so many other projects—"

Now if only her Dream Machine rainbow could conjure up some additional time. . . .